

FAX

2015 FEB 16 PM 5:04

TO: BUREAU OF LAND MANAGEMENT

FAX: (505) 954-2010

PHONE:

SUBJECT: PROTEST

COMMENTS: 11 PAGES INCLUDING COVER SHEET

I am protesting the upcoming auction for the right to drill for gas under Lewisville Lake. For the Bureau of Land Management to sell a 10-year mineral rights lease in Santa Fe on April 20 is irresponsible and simply said just cannot be done. If you think that folks question the wisdom of drilling under a lake with a [bad dam](#), a lake that Dallas uses for drinking water, then you'd be right. Lewisville Lake has been the subject of recent news reports regarding dam deficiencies. [Wendy Park, staff attorney for the Center for Biological Diversity] is concerned that the fracking process for horizontal wells under the lake could cause increased seismic activity — a concern echoed by [Rita Beving, of the Clean Water Fund]. She worries that either fracking, or any possible wastewater disposal that might occur in the vicinity could weaken the dam and cause a breach.

The Sierra Club's Lone Star Chapter echoed the concerns of the others. Cyrus Reed, the group's conservation director, emphasized his concerns about water contamination. He thinks contamination could happen if a well's cementing or casing were to fail or if a spill were to occur.

I am a homeowner in the North West Dallas Flood Control District. My address is 209 Longmeadow Drive, Coppell, TX 75019.

Diane Neff

[The Dallas Morning News](#)

Sandbags and tarps have been deployed in an attempt to prevent further erosion of a 160-foot-long slide on the Lewisville Dam. To engineers, the slide's proximity to another major one that happened in 1995 suggests instability that could threaten the dam's foundation.

NORTH TEXAS

The Dam Called Trouble

The Army Corps of Engineers will need millions of dollars to repair the Lewisville Lake Dam, one of the nation's most dangerous. A breach could put 431,000 people in harm's way.

By George Getschow | Special Contributor Photos and video by [Nathan Hunsinger](#) | Staff Photographer Published December 12, 2015

The problem — one of many — first appeared as last May's record rainstorms quickly filled the region's reservoirs. An instrument at the Lewisville Lake Dam showed pressure building under the downstream side.

Jason Vazquez, dam safety program manager for the Army Corps of Engineers at the time, collared another engineer, and in pelting rain they raced to the affected area, officially known to the Corps as "Seepage Area No. 1."

Even during the seven-year drought, the area had looked like a swamp, covered with chest-high cattails and weeds. Corps technicians sometimes encountered water moccasins and alligators as they measured seepage. This time, Vazquez and his partner, wearing rain slickers and rubber boots, spotted something far more disturbing: water and sand bubbling up from a tiny hole in the ground.

Such a "sand boil" indicates that increasing seepage has created a passage under the base of the dam. If not stopped, it could lead to a rupture of the dam.

Vazquez remembers standing in the middle of the swamp, soaking wet, wondering whether the dam he nicknamed "Trouble" was about to become a regional disaster. The 35-year-old engineer called his bosses at the district's Emergency Operations Center in Fort Worth.

An alligator snapping turtle rests in the marshland of "Seepage Area Number 1," on the downstream side of Lewisville Dam. During last May's rains, a "sand boil" appeared in the area, indicating increasing seepage that, if not stopped, could lead to a rupture of the dam.

From bad to worse

Even before last spring's rains, the Lewisville Dam was listed by the Corps as the eighth-most-hazardous in the country. Recent rains have made it worse, the Corps says.

The dam is so unstable now that the Fort Worth District is considering asking Corps headquarters to upgrade its risk classification to the highest: "critically near failure" —

that is, “almost certain to fail under normal operations ... within a few years without intervention,” according to a Corps document.

The Corps finished building the dam in 1955 and is responsible for its safety and upkeep. Only 34 miles upstream from Dallas, the Lewisville Dam holds back 2 million acre-feet, or 2.5 billion tons, of water when the lake is full. If the dam failed, the magnitude of all that water unleashed from Lake Lewisville down the Trinity River would dwarf the worst dam disaster in American history.

That would be the Johnstown, Pa., flood of May 31, 1889, which occurred after several days of pounding rain breached the South Fork Dam. The flood killed 2,209 people and devastated the city. The Lewisville Dam holds back 125 times as much water as the South Fork Dam.

Only 34 miles upstream from Dallas, the 6.2-mile-long Lewisville Dam holds back 2.5 billion tons of water when the lake is full. That’s 125 times as much as the dam that failed in Johnstown, Pa., in 1889, killing 2,209 people in the nation’s worst flood.

‘Very high risk’ to cities

The public hasn’t been told the full story about the Lewisville Dam. Internal documents make clear that the Corps has known about its “high risk of failure under an extreme event” for many years.

In 2008, a group of Corps engineers and analysts from outside the Fort Worth district performed an in-depth assessment of the dam and discovered some hair-raising defects: seepage under the foundation was creating pressure and uplift conditions at one end of the dam.

There were signs of embankment instability during “extreme loading conditions” — Corps-speak for a rapidly rising reservoir. The emergency spillway suffered from erosion and structural distress.

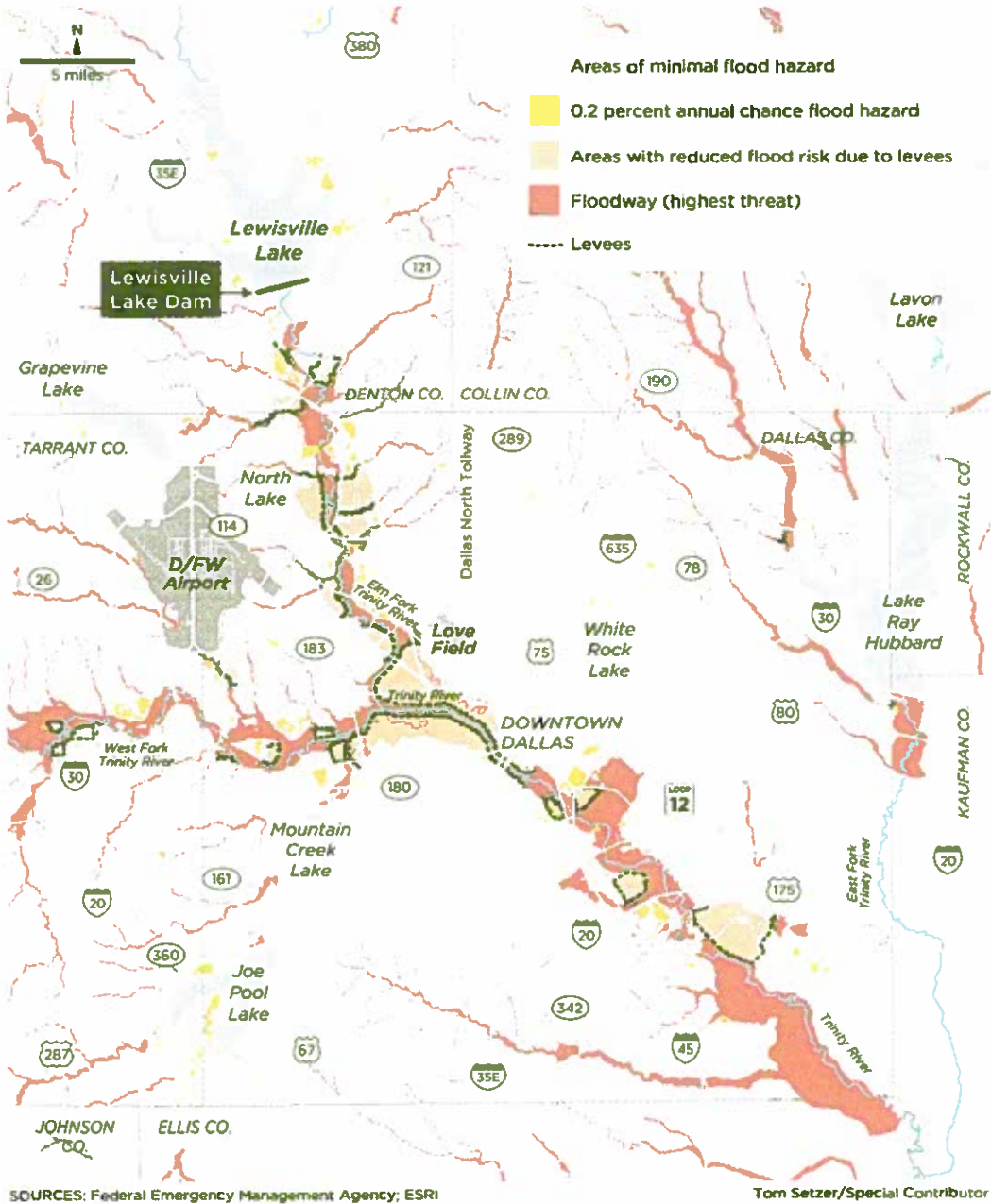
The team of Corps analysts concluded that “the likelihood of failure from one of these occurrences ... is too high to assure public safety” and that the dam posed a “very high risk” to the population centers downstream from the dam. That is, Lewisville, Coppell, Carrollton, Farmers Branch, Irving, Las Colinas, Dallas and points south.

The analysts’ findings were corroborated by another study the following year at the Trinity Regional Project Office of the Corps adjacent to the Lewisville Dam. This new team of engineers and analysts identified “significant potential failure modes ... with respect to the project condition and the potential downstream consequences,” according to a Corps document.

But what the Corps tells itself about the Lewisville Dam is different from what it tells the public. “We want to get the message out that there’s a potential for something bad to happen, but we don’t want to unduly panic the public,” says an official involved in the communications. “So we sugarcoat the message a bit.”

Dangers downstream

Here's a look at **general** flood hazard categories in the Dallas-Fort Worth area. If there were a catastrophic breach of the Lewisville Lake Dam, floodway areas downstream along the Trinity River and its **tributaries** would be hit hardest but even areas protected by levees under normal conditions would likely be severely impacted.



For example, starting in 2010, the Corps began holding public meetings with residents and officials from the communities downstream to discuss the Corps' plans "to improve safety" at the Lewisville Dam. In public meetings and press releases, Corps officials stressed that the dam was not in imminent danger of failing and was operating as designed.

At a public meeting at the Medical Center of Lewisville in 2013, Corps officials acknowledged the uncontrolled seepage, the potential instability of the emergency spillway and embankment and other “areas of concern.”

But they assured the public that the Corps had implemented a number of temporary risk-reduction measures to address the problems while pressing ahead with further studies to determine the best methods to fix it.

“Dam failure is not likely, not at all,” Anita Branch, a project engineer for the Corps’ Fort Worth District, reassured the gathering in Lewisville.

‘Indicators of distress’

Tell that to Jason Vazquez. During the height of the record rain storm last May, as floodwaters began filling the Lewisville reservoir, Vazquez and his field operations team spent days and nights, flashlights in hand, walking up and down the dam, looking for what the Corps calls “indicators of distress.” Four other dams in the district were also placed on a 24-hour watch for about six weeks in May and June.

The higher the water rose in the reservoir, the greater the pressures on the Lewisville Dam. Vazquez and his operations team knew that the structural integrity of the dam was already compromised.

Under the intense loading on the dam, the unspoken question among the team of inspectors walking back and forth along the rain-soaked contours was, Would it hold? Vazquez thought it would, but he and his operations team had to be prepared in case it didn’t.

A storage system is used to measure seepage flowing under the Lewisville Dam. Excessive seepage can eventually form a pipe, or cavity, to the reservoir, often leading to complete failure of the dam.

So when an instrument reading showed pressure rising at Seepage Area No. 1 — the same area where Corps specialists had worried for years that excessive seepage could cause a rupture or blowout — Vazquez and another engineer dashed to the boggy area. That’s when they spotted the sand boil. Clearing away tall cattails and weeds with a weed-whacker to get a better view, Vazquez was shocked. It looked like a small whirlpool spinning and spouting from underground.

Now he had a major emergency on his hands. Once a sand boil starts, it’s hard to stop. A sand boil indicates that excessive seepage is starting to erode soil material from the downstream slope or foundation of the dam through to the upstream side to form a pipe, or cavity, to the reservoir.

The condition, called piping, often leads to a complete failure of an earthen dam.

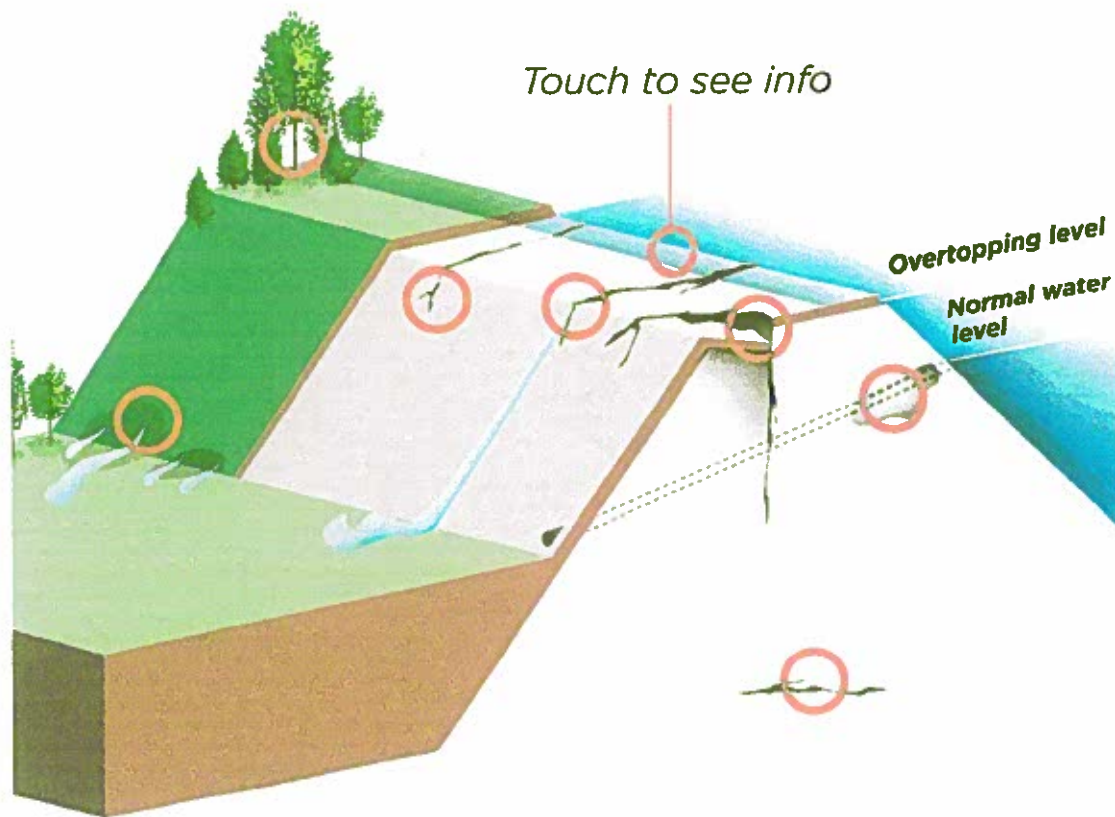
After he called his bosses at headquarters, Vazquez directed his field operations team to place a one-layer ring of sandbags around the sand boil, allowing the pool of water inside to rise about six inches. The method is supposed to equalize the pressure and prevent the water and soil particles from expanding.

By now the entire Corps was on high alert. Corps officials notified the Texas Division of Emergency Management, a branch of the Texas Department of Public Safety in Austin, as well as emergency officials downstream.

Emergency coordinators prepared to begin evacuations in their communities. “We had our Swift Water Rescue Team ready and had staff on hand to deal with everything,” says Jason Carriere, Irving’s emergency management coordinator. “The sand boil was just one of many emergencies we had to deal with during that period of heavy rains and flooding.” The Corps also informed the water departments in Dallas and Denton that depend on Lewisville Lake for drinking water that if the boil progressed, it would have to conduct an emergency draw-down of the lake to relieve the pressure.

Typical defects and potential failure modes

Dam failures are most likely to happen for these reasons:



SOURCES: Association of State Dam Safety Officials, Federal Emergency Management Agency, Based on graphic by Jeff Colson, USACE Dam Safety Program

Michael Hogue/DMN

Evacuations called off

The sandbagging worked. The boil, which had surfaced May 17, subsided in a matter of days. And the evacuations were called off. Vazquez credits the Corps’ exhaustive training programs — which emphasize that a rapid response to a sand boil can prevent piping from progressing into a breach — for his operation team’s success in dealing with the potential catastrophe.

But the troubles at the Lewisville Dam were far from over. On June 23 some of the same members of the operations team who dealt with the boil spotted another disturbing sight: a giant hole on the upstream face of the embankment, 160 feet long and 23 feet wide.

It looked as if someone had detonated a bomb. Giant boulders covering the embankment, called rip-rap, had come tumbling down, along with a section of the asphalt road along the crest of the dam.

The Corps calls it, simply, a "slide." But there are two very different types of slides. One, a shallow slide, is typically a few feet deep to as much as 40 feet deep. The other is a deep-seated slide, typically 50 feet to 100 feet deep and sometimes extending down into the foundation of the dam.

The massive slide at the Lewisville Dam, which is not yet repaired, is adjacent to an earlier major slide that happened in 1995, suggesting to engineers instability within the embankment. And as wave after wave of pounding rainstorms sweeps across North Texas, some engineers say the new slide could develop into a deep-seated slide, threatening even the dam's foundation.

Adrian Espinoza, a 52-year-old construction worker, had heard about "the giant hole in the side of the dam" from fellow fishermen who had finagled a way to get their bass boats launched on the lake even with the boat ramps closed by high water. Their stories about the slide sounded like fish tales to Espinoza. But when the boat ramps reopened about two months later, he decided to see for himself.

The stories, it turns out, weren't myth. "It's a monstrous hole that's awfully close to the reservoir," says Espinoza, who maneuvered his 18-foot bass boat to shore to get a closer look. "Somebody's covered it with plastic tarps, sandbags and wooden crates. But if we get another round of heavy rain and the reservoir fills up, the dam could go."

The Corps maintains that the slide doesn't pose an immediate risk of catastrophic failure. Right now, the hole doesn't extend into the foundation. Moreover, the Corps says it has devised a way to repair the slide even if rainstorms fill the reservoir again.

The solution: a cofferdam, a watertight enclosure pumped dry to enable heavy-duty construction work below the reservoir's waterline. The cofferdam "will prevent any further damage to the dam," says Sarwenaj Ashraf, who was recently appointed the district's dam safety program manager, succeeding Vazquez.

The Corps has awarded a \$6.4 million contract to repair the slide. The work will begin in early January, and the repairs are expected to be completed in the spring.

Preventing a slide

Yet preventing another massive slide at the Lewisville Dam may not be as easy as fixing the last one.

For one thing, engineers say that the 13.2 million cubic yards of fine-grained soil and clay used to build the 6.2 mile-long embankment shrinks during droughts and swells during rains, reducing the slope's shear strength. In layman's terms, that means the embankment is brittle when it's dry and spongy when it's wet.

Corps engineers also say the embankment is more unstable since the May flood because cracks have spread along the 20-foot-wide crest of the dam. In fact, the Corps believes that "desiccation cracking" at the crest of the dam caused the earthen slope to collapse and slide.

The Corps says heavy rains in mid-May and early June filled the 1- to 3-inch-wide cracks, saturating the soil underneath and vastly increasing its weight. Gravity took over

from there. "That mass [of saturated soil] sitting on top got heavier than the material next to it, and that's when that mass slid," says Ashraf.

Dramatic shrinking and swelling of the embankment during the rapid drought-to-deluge cycle may also account for another deformity that the Corps spotted on the upstream face of the dam after the May rains: a large, bowl-like depression in the slope across from Seepage Area No. 1.

The depression would be hard to spot without the bright orange cones the Corps put out along the top of the dam to mark its location and to see if it progresses into an active slide. Corps engineers say the same soil properties that make the Lewisville Dam's embankment susceptible to slides provide a level of resiliency against catastrophic erosion through the foundation, a situation that threatens other dams around the country.

Workers deploy sandbags and tarps to temporarily prevent further erosion along a 160-foot-long slide in the Lewisville Dam. Corps engineers say the embankment is more unstable since the May flood because cracks have spread along the 20-foot-wide crest of the dam.

431,000 in harm's way

For the last four years, while Vazquez served as the district's dam safety program manager, avoiding catastrophe at the Lewisville Dam has been at the forefront of his mind. He studied the inundation maps and consequence data for all the district's dams. If they failed, where would the water go? How many people would be flooded out? How many killed?

When he looked at the data for a breach at the Lewisville Dam, he couldn't believe his eyes. It showed 431,000 people in harm's way. The Corps has prepared maps of the inundation area and casualty estimates but won't release them to the public on orders from the U.S. Department of Homeland Security.

The Corps also will not release a list of its top 10 high-hazard dams in the country because it might "open the public to security risks from those that could use the information to do harm," according to a spokesman.

Standing atop the crest of the Lewisville Dam last February, his eyes fixed on the Dallas skyline, Vazquez grew silent as he thought about the catastrophic consequences of a breach. "I think about it a lot," he says.

With a full reservoir behind it, a 65-foot-tall flood wave traveling 34 mph would quickly inundate a wide swath of Lewisville, Coppell, Carrollton, Farmers Branch, Irving, Las Colinas and other communities bordering the Trinity River.

The wave would sweep everything in its path — the Lewisville dump, water treatment plants, LBJ Freeway, the Bush Turnpike, Interstate 35E, the State Highway 121 Tollway, Love Field, the Hospital District, office complexes, senior citizen centers, shelters, schools, playgrounds and 53,000 other structures.

Like a tsunami, the wave would submerge downtown Dallas in roughly 50 feet of water, the Corps estimates, causing more than \$21 billion in property damage, before continuing south down the Trinity River toward the Gulf of Mexico. "It would be a much bigger magnitude to the Dallas area than Hurricane Katrina was to New Orleans," says Vazquez. "It's a nightmare scenario."

Dhruv Pandya, assistant director in charge of the city of Dallas' flood control system, peers at a photograph of the lake's inundation area that he keeps atop his desk as a reminder of what would happen if the dam breached. "That keeps me on my toes all the time," he says, pointing to the apocalyptic image.

If the dam were to break, a 65-foot-tall flood wave would sweep through the brush to the homes and buildings beyond, swamping LBJ Freeway, the Bush Turnpike, Interstate 35E, Love Field, the Hospital District, senior centers and schools. Downtown Dallas would be submerged in 50 feet of water, the Corps of Engineers estimates.

A few years ago, Pandya says, Dallas set up a contingency Emergency Operations Center outside of downtown Dallas because its current center would be underwater if the dam breached.

The Corps has not been idle, either. Over the last several years, it has implemented what it calls "interim risk reduction measures" to stave off a dam failure at Lewisville while at the same time preparing for the worst.

For example, the Corps has drilled about 10 new relief wells in Seepage Area No. 1 to relieve pressure and prevent further piping under the dam. The new wells supplement dozens of wells and seepage collection systems already on site.

The federal agency has also stepped up emergency training exercises with officials downstream and urged them to set up an early warning system to alert residents if the dam begins to fail. It's also built up its stockpiles of sandbags, pumps and other emergency materials to prevent a small-scale breach from mushrooming into a catastrophic one.

The Corps has also changed its water control plan to allow for a much higher volume of water to be discharged from the reservoir to reduce the pressure on the dam during heavy rains and rising pools. But as residents downstream from the dam learned last May and June, releasing more water from the dam to prevent a breach can greatly exacerbate flooding.

As the Lewisville reservoir rose above the top of what the Corps calls its "conservation pool" — 522 feet above sea level — during the spring rains, the Corps began releasing millions of gallons of water, flooding roads, parks, apartment buildings and businesses. After another deluge two weeks ago, the reservoir rose more than eight feet above the conservation pool, putting it just two feet below the emergency spillway.

Whenever the dam is endangered by heavy loads, the Corps says, protecting it assumes a higher priority than the consequences of downstream flooding. The Corps points out that the Lewisville Dam has prevented \$31.2 billion in flood damage since it went into service in 1955.

"It's a balancing act between maintaining the integrity of the structure while also minimizing flood damages downstream," says Vazquez, who spent weeks on his BlackBerry coordinating with the state's Emergency Operations Center on emergency releases at Lewisville and the district's other lakes. Vazquez recently accepted a job as senior engineer for dams and locks for Arcadis NV, a global design, engineering and management consulting company based in Amsterdam.

A permanent fix

The Corps says it's working as fast as it can to come up with a permanent fix for its badly distressed dam. It plans to make its decision in the next six months.

The Corps is weighing a wide range of options, including constructing a "cut-off wall" from the crest of the dam deep into its foundation to stop the flow of seepage.

Workers throw sandbags and lay tarps to prevent further erosion of the slide on the dam. Corps of Engineers officials say a more permanent fix would cost between \$50 million and \$500 million.

Another option is building a gigantic earthen berm over Seepage Area No. 1 to tamp down uplift pressures near the "toe" of the dam, where the downstream face meets the ground surface. In fact, the Corps has already been removing utility poles in the area in case it decides a berm is the best option.

As for embankment instability, the Corps is examining flattening and strengthening the slopes with reinforcing material. "We're looking at different designs, different methods," says Ashraf, "to come up with what fits the problem best."

Rehabilitating the aging dam, which is now well past its design life, won't come cheap. Corps officials estimate repair costs between \$50 million and \$500 million, depending on which method or methods are chosen.

Dallas and Denton, Lewisville Lake's principal water users, are obliged under existing water supply contracts to share some of the costs of operations, maintenance and repair of the dam. Denton's share is considerably less than Dallas'.

As the Corps ponders what to do about fixing the dam, fishermen like Espinoza are nervously watching the weather forecasts to see if El Nino stirs up another onslaught of rainstorms across North Texas, wreaking havoc on the Lewisville dam once again.

"Let's just hope we don't have another deluge like the last one," Espinoza says.

George Getschow is a principal lecturer for the Frank W. Mayborn Graduate Institute of Journalism at the University of North Texas. Graduate students Aaron Claycomb, Ashlea Sigman and Kyle Blankenship contributed reporting for this story.

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